

Human Exploration and Development of Space

Mission

The Human Exploration and Development of Space (HEDS) Enterprise mission is to open the space frontier by exploring, using, and enabling the development of space to expand the human experience into space and bring the benefits of space to Earth. The Enterprise mission includes the development of innovative technologies to support HEDS programs and make them available for other applications that provide benefits to the Nation. Knowledge and discoveries will be shared with the public to enhance science, mathematics, and technology education and increase the scientific and technological literacy of all Americans.

Implementation Strategy

The HEDS Enterprise strategy is integrated and implemented by two program offices: the Office of Space Flight (OSF) and the Office of Life and Microgravity Sciences and Applications (OLMSA).

The OSF strategy to contribute to the HEDS mission is focused on providing the infrastructure to enable research, exploration, and development, and consists of four major components: ensure safe, reliable and affordable access to space; establish permanent human presence aboard an earth-orbiting research laboratory; provide a space operations infrastructure; and expand the commercial development of space. To ensure safe, reliable and affordable access to space, safety investments provide for the modifications and improvements of the Space Shuttle and ground facilities through replacement of obsolete systems and expansion of safety and operating margins. Investments are also made in Space Shuttle operations including hardware production, ground and payload processing, launch and landing operations, flight crew operations, training, logistics, sustaining engineering, and in support of agency-wide needs for expendable launch vehicle (ELV) services. The implementation strategy for establishing permanent human presence in space is encompassed in the International Space Station (ISS) program. Assembly began with the November 1998 launch of the U.S.-owned/ Russian-launched functional cargo block (FGB) and permanent human presence should begin this year, as assembly continues. A space operations infrastructure that supports agency-wide operations is provided, and innovative approaches to expanding the commercial development of space are being pursued.

The OLMSA strategy to contribute to the HEDS mission is focused on conducting three types of research and technology development: fundamental, mission-driven, and application-driven research. OLMSA supports fundamental research driven by an emphasis on expanding scientific knowledge. Its focus on mission-driven research improves knowledge and technology for human space flight. The application-driven research of OLMSA seeks to transfer knowledge, expertise, and technology from HEDS missions to other uses that provide benefits to the Nation.

Enterprise Resource Requirements

The President has requested the following budget for FY99 to FY05 to support the accomplishment of HEDS goals:

	<u>FY 1999</u>	<u>FY2000</u>	<u>FY 2001</u>	<u>FY2002</u>	<u>FY2003</u>	<u>FY2004</u>	<u>FY2005</u>
RY\$M	5,744	5,742	5,802	5,688	5,243	5,141	5,012
CSFTE	5,364	5,294	5,627	5,539	5,382	5,170	4,967

Performance Measures

Goal: Expand the Space Frontier.

Objective: Expand human exploration through collaborative robotic missions

- Target: Complete testing and delivery for spacecraft integration of experiments for the Mars Surveyor Program 2001 orbiter and lander missions. HEDS research planned for the mission includes radiation monitoring, soil and dust analysis, and an experiment on the production of propellants from the Martian atmosphere. 1H1

Objective: Define innovative human exploration mission approaches

- Target: Complete initial next decade planning mission architecture studies and technology plans. Architecture studies support near-term technology investment decisions to create building blocks that may enable a range of long-term planning options for future missions of exploration. 1H2

Objective: Invest in enabling high-leverage technologies

- Target: Initiate the HEDS Technology/Commercialization program and establish a synergistic relationship with industry. Indicator is a successful response to the initial NASA Research Announcement, with a 50% cost share from industry, where appropriate. 1H32

Goal: Expand Scientific Knowledge.

Objective - In partnership with the scientific community, use the space environment to investigate chemical, biological and physical systems.

- Target: Support an expanded, productive research community to include 975 investigations annually by 2001. HEDS seeks to prepare and support a research community to take full advantage of research opportunities in the coming era of orbital research, including support for 975 investigations in 2001. 1H3
- Target: Conduct outstanding peer-reviewed and commercial research on STS 107 to advance knowledge in the fields of medicine, fundamental biology, biotechnology, fluid physics, materials processing and combustion. 1H4
- Target: Begin research on the International Space Station. HEDS will increase fundamental knowledge and address critical questions in crew health and safety by conducting six to ten investigations on the International Space Station. Other investigations will include research on the behavior of colloids as a first step in the synthesis of new materials from colloidal particles, and detailed measures of the acceleration environment on ISS for use in planning future research. 1H5

Goal: Enable and establish a permanent and productive human presence in Earth orbit.

Objective: Provide safe and affordable access to space.

- Target: The Office of Space Flight will expedite a safety improvement program to ensure the continued safe operations of the Space Shuttle. The performance target is to have in place a Shuttle upgrade program that ensures the availability of a safe and reliable Shuttle system to support Space Station Assembly milestones and operations. The FY 2001 indicators include completion of the Checkout and Launch Control System applications software for the Orbiter Processing Facilities. All safety improvements are planned to be in place by 2005. 1H6
- Target: The Office of Space Flight continues to invest in Space Shuttle operations. Investments include hardware production, ground processing, launch and landing operations, flight crew operations, training, logistics, and sustaining engineering. The performance target is to achieve 8 or fewer flight anomalies per mission. 1H7

The Shuttle program uses safety/reliability and stability/schedule indicators. The Space Flight Operations Contractor, United Space Alliance, is subject first to an incentive safety/reliability gate, after which come various stability/schedule indicators like the one presented here. The FY 2001 indicator is to measure (post flight) the number of vehicle flight anomalies.

- Target: Achieve 100% on-orbit mission success. This target will be measured against the customer's mission objectives and the post-flight reporting of completion of mission objectives. 1H30

Objective: Deploy and use the ISS to advance scientific, exploration, engineering, and commercial objectives

- Target: Development, manufacture and test of the ISS vehicle elements are phased in conjunction with the launch and on-orbit assembly schedule. The performance target is to successfully complete the majority of the planned development schedules and milestones required to support the Multi-element Integration Testing (MEIT). 1H10

MEIT tests perform integration testing with several launch elements to increase on-orbit confidence. The FY 01 indicator will include completion of MEIT to include flight elements for assembly flights 8A through 12A. This will be measured by completion of five-planned test configurations.

- Target: Deployment of the ISS occurs with on-orbit assembly over several years. Successful and timely deployment is dependent on the Shuttle and other international launch vehicles, and the provision of some elements and services from international partners and participants. The performance target is to successfully complete the majority of the ISS planned on-orbit activities such as delivery of mass to orbit and enhanced functionality. 1H11

FY01 indicators will include expansion of the capabilities of the ISS through launch and delivery of 180,000 lbs. of hardware and logistics to the ISS; and initiation and demonstration of ISS Extravehicular Activity (EVA) capability to support up to 30 EVAs annually from the U.S. Airlock. This will be measured by completion of a minimum of 5 EVAs from the ISS Airlock.

- Target: Operations of the ISS occur as the vehicle is being developed and assembled. The performance target to successfully complete the majority of combined ISS planned operations schedules and milestones as represented by permanent human on-orbit operations. 1H12

FY01 Indicators will include the presence of permanent human on-orbit operations with an estimated 8,000 crew hours dedicated to assembly, vehicle operations and payload operation.

- Target: The conduct of research is an important objective of the ISS. During assembly, the ISS will add pressurized volume, experiment racks, facilities and unpressurized payload accommodations in support of research opportunities. The performance target is to successfully complete the majority of the planned research activities in support of initiation of on-orbit research opportunities. 1H13

FY 01 Indicators will include initiation of on-orbit research in the U.S. Laboratory focusing on early payload opportunities in the Human Research Facility (HRF-1) and multipurpose EXPRESS Racks.

- Target: The ISS program has undertaken a series of selected developments and support activities to enhance the robustness of the vehicle, enhance safety and reduce reliance on capabilities contributed by Russia. The performance target is to successfully complete no less than 85% of the planned Russian Program Assurance schedules and milestones required for the development of the Propulsion Module. 1H14

FY01 indicators will include initiation of Propulsion Module fabrication/assembly/integration and testing in preparation for launch in late FY 2002. This will be measured by completion of schedule milestones.

- Target: Crew transportation and return for up to three crewmembers is planned to be provided by Russia throughout the life of the program. In order to further enhance ISS safety, NASA has initiated the Phase 1 development of a crew return vehicle (CRV) that could provide the U.S. crew return capability to support the emergency return of up to seven crew, the full crew complement planned for the ISS. A U.S. crew return capability is planned for deployment late in the ISS assembly sequence. The performance target is to successfully complete no less than 75% of the planned crew return capability schedules. FY01 indicators will include accomplishment of program schedule milestones for Phase 1 development of a crew return vehicle (CRV) that could provide the U.S. crew return capability. 1H15

Objective: Ensure the health, safety and performance of humans living and working in space

- Target: Develop new biomedical and technological capabilities to facilitate living and working in space and return to Earth. HEDS will flight test a new method for reducing the risk of kidney stone formation and develop two new evidence-based countermeasure candidates ready for evaluation. 1H17
- Target: Develop and demonstrate technologies for improved life support systems. HEDS will demonstrate, in ground test, technologies that could reduce up to 25% of life support logistics over ISS baseline as determined by the detailed calculation of a life support equivalent system mass index and place online for review and comment. Equivalent system mass index is a measure of the performance of a life support system incorporating demonstrated technologies. Performance improves as improved technologies are demonstrated. 1H18
- Target: Initiate implementation of the Bioastronautics Initiative. The bioastronautics initiative will enhance activities already underway in order to ensure the health, safety, and performance of humans in space by accelerating research and development of "countermeasures" (diagnostics, therapy, preventatives, and rehabilitation methods) to maintain the health of flight crews on long duration missions and transfer this knowledge and technology to benefit health on Earth. Bioastronautics research is an interdisciplinary set of focused research activities bringing together biology, physics, chemistry, communications technology and nano-technologies that will revolutionize medical care delivery in space and on Earth. Indicators for FY 01 will include initiating a NASA/NCI collaboration to develop minimally invasive technologies and approaches for detecting and interpreting biological signatures that signal the emergence of disease. 1H31

Objective: Meet sustained space operations needs while reducing costs.

- Target: Increase the percentage of the space operations budget allocated to acquisition of communications and data services from the commercial sector to 15% in FY 2001. The space Communications Program will conduct tasks that enable commercialization and will minimize investment in government infrastructure for which commercial alternatives are being developed. 1H20

- Target: Achieve at least 95 percent of planned data delivery from space flight missions as documented in space, ground, deep space, and NASA integrated service networks performance metrics consistent with detailed program and project operations requirements in project service level agreements. 1H21

Goal: Expand the Commercial Development of Space.

Objective: Facilitate access to space for commercial researchers.

- Target: Establish at least ten new, active industrial partnerships to research tomorrow's space products and improve industrial processes through NASA's Commercial Centers, and find opportunities for space experiments. 1H22

Objective: Foster commercial participation on the International Space Station.

- Target: Foster commercial endeavors by reviewing and/or implementing new policies and plans, such as the Space Station resource pricing policy and intellectual property rights policy. Ensure that Space Station resources allocated to commercial research are utilized by commercial partners to develop commercial products and improve industrial processes. 1H23

Goal: Share the Experience and Discovery of human space flight

Objective: Increase the scientific, technological and academic achievement of the nation by sharing our knowledge, capabilities, and assets.

- Target: Support participation in HEDS research. In 2001 HEDS will enable at least 50 students to participate in commercial space flight and technologies research and provide 200 elementary and high school classrooms nationwide with electronic (multimedia/computer technologies) and printed materials that focus on activities in science, math and technology relating to life sciences and microgravity research and specifically written for students in grades K-12. In addition HEDS will complete a broadly based student competition on innovative design concepts that address HEDS technological challenges and complete a customer engagement plan. 1H26

Cross-cutting target

- Target: Improve health of the NASA workforce. HEDS will develop and implement supervisor-specific training for the identification and management of stress in the work unit. Develop and implement training on techniques for coping with stress for the individual employee and begin a robust audit program of NASA Centers' occupational health programs, completing at least six (6) to ensure quality and continuous improvement of medical care and services including medical and environmental monitoring efforts, preventive services, emergency response capability, and clinical intervention capability. 1H29

Internal Assessment

Interim evaluation and monitoring of performance targets will be conducted as an element of regular meetings of the Office of Space Flight and HEDS Management Boards and the Board of Directors of the Office of Life and Microgravity Sciences and Applications. As a matter of NASA policy, relevant HEDS performance targets are included in the performance plans submitted to the Administrator by the Associate Administrator of the Office of Life and Microgravity Sciences and Applications, and the Associate Administrator of the Office of Space Flight.

Final data collection, reporting and verification for inclusion in the Annual Performance Report will rely on several different processes depending on the particular Performance Target. Wherever possible, a specific tangible product has been identified for individual performance targets to strengthen the validation process.

For many HEDS performance targets, (e.g. Space Shuttle in-flight anomalies, Space Station assembly milestones) verification of performance is straightforward and progress is monitored through regular management channels and reports. For targets which include references, investigators and/or peer reviewed publications, HEDS publishes, and makes available on line, an annual "Task Book and Bibliography" which includes lists of investigators, publications and research results. This database will be an essential source of data for evaluating performance against several targets.

External Assessment

To assist in evaluating those performance goals which are more difficult to associate with specific tangible products, HEDS will employ an annual external assessment process. HEDS has asked the Life and Microgravity Sciences and Applications subcommittee of the NASA Advisory Committee to review and evaluate performance on specific OLMSA targets on an annual basis. An OSF Advisory Committee currently being formed will review and evaluate OSF performance targets.

Human Exploration and Development of Space FY01 Performance Plan

Strategic Plan Goal	Strategic Plan Objective	O1#	FY 01 Target	FY 01 Indicators
Goal: Expand the Space Frontier.	Objective: Expand human exploration through collaborative robotic missions	1H1	Complete testing and delivery for spacecraft integration of experiments for the Mars Surveyor Program 2001 orbiter and lander missions.	Complete testing and delivery for spacecraft integration for the radiation monitoring experiment hardware (MARIE). Complete testing and delivery for spacecraft integration for the soil and dust analysis experiment (MECA). Complete testing and delivery for spacecraft integration for the Mars In-Situ Propellant Production Precursor experiment (MIP) .
Goal: Expand the Space Frontier.	Objective: Define innovative human exploration mission approaches	1H2	Complete initial next decade planning mission architecture studies.	Complete initial next decade planning mission architecture studies.
Goal: Expand the Space Frontier.	Invest in enabling high-leverage technologies	1H32	Initiate the HEDS Technology/Commercialization program and establish a synergistic relationship with industry.	Indicator is a successful response to the initial NASA Research Announcement, with a 50% cost share from industry, where appropriate.
Goal: Expand Scientific Knowledge.	Objective - In partnership with the scientific community, use the space environment to investigate chemical, biological and physical systems.	1H3	Support an expanded, productive research community to include 975 investigations by 2001.	Expand support to approximately 975 investigations (from 877 reported in FY 99). Publish abstracts and reports of progress for over 90% of FY 2000 research investigations (tasks) and make this publication available on the internet. Support publication of approximately 1500 journal articles in refereed journals. Support emergent microgravity research programs in biophysics and tissue engineering by selecting up to 10 new investigations.
Goal: Expand Scientific Knowledge.	Objective - In partnership with the scientific community, use the space environment to investigate chemical, biological and physical systems.	1H4	Conduct outstanding peer-reviewed and commercial research on STS 107 to advance knowledge in the fields of medicine, fundamental biology, biotechnology, fluid physics, materials processing and combustion.	Acquire unique data to improve crew health and safety and expand understanding in biology, biotechnology cell science, fluid physics, and combustion science.
Goal: Expand Scientific Knowledge.	Objective - In partnership with the scientific community, use the space environment to investigate chemical, biological and physical systems.	1H5	Begin research on the International Space Station.	Increase fundamental knowledge in biological and biomedical sciences and address critical questions in crew health and safety by conducting 6 to 10 ISS investigations. Acquire unique data on colloidal self-assembly as an essential first step in the synthesis of new materials from colloidal particles. Measure the ISS acceleration environment, develop models to characterize the effects of that environment on ISS research, and disseminate those results to the ISS investigator community.

Human Exploration and Development of Space FY01 Performance Plan

Strategic Plan Goal	Strategic Plan Objective	01#	FY 01 Target	FY 01 Indicators
Enable and establish a permanent and productive human presence in Earth orbit.	Provide safe and affordable access to space.	1H6	The Office of Space Flight will expedite a safety improvement program to ensure the continued safe operations of the Space Shuttle that ensures the availability of a safe and reliable Shuttle system to support Space Station Assembly milestones and operations.	CLCS application for the Orbiter Processing Facilities is completed.
Enable and establish a permanent and productive human presence in Earth orbit.	Provide safe and affordable access to space.	1H7	Achieve 8 or fewer flight anomalies per mission.	Achieve 8 or fewer flight anomalies per mission.
Enable and establish a permanent and productive human presence in Earth orbit.	Provide safe and affordable access to space.	1H30	Achieve 100% on-orbit mission success.	Pre-flight mission/payload objective. Post-flight mission report.
Enable and establish a permanent and productive human presence in Earth orbit	Deploy and use the ISS to advance scientific, exploration, engineering, and commercial objectives	1H10	Successfully complete the majority of the planned development schedules and milestones required to support the Multi-element Integration Testing.	Complete Multi-Element Integration Test II (MEIT) to include flight elements for assembly flights 8A through 12A. This will be measured by completion of five-planned test configurations. MEIT Tests perform integration testing with several launch elements to increase on-orbit confidence.
Enable and establish a permanent and productive human presence in Earth orbit	Deploy and use the ISS to advance scientific, exploration, engineering, and commercial objectives	1H11	Successfully complete the majority of the ISS planned on-orbit activities such as delivery of mass to orbit and enhanced functionality.	Continue to expand the capabilities of the ISS through launch and delivery of 180,000 lbs. of hardware and logistics to the ISS. Initiate and demonstrate station-based Extravehicular Activity (EVA) capability to support up to 30 EVAs annually from the U.S. Airlock. This will be measured by completion of a minimum of 5 EVAs from the ISS Airlock.
Enable and establish a permanent and productive human presence in Earth orbit	Deploy and use the ISS to advance scientific, exploration, engineering, and commercial objectives	1H12	Successfully complete the majority of combined ISS planned operations schedules and milestones as represented by permanent human on-orbit operations.	Conduct permanent human on-orbit operations with an estimated 8,000 crew hours dedicated to assembly, vehicle operations and payload operations.
Enable and establish a permanent and productive human presence in Earth orbit	Deploy and use the ISS to advance scientific, exploration, engineering, and commercial objectives	1H13	Successfully complete the majority of the planned research activities in support of initiation of on-orbit research opportunities.	Initiate on-orbit research in the U.S. Laboratory focusing on early payload opportunities in the Human Research Facility (HRF-1) and four multipurpose EXPRESS Racks. Complete integration testing and KSC processing for the Microgravity Sciences Glovebox (MSG), refrigerator/freezer, and Window Observational Research Facility (WORF-1) in preparation for launch on UF-1 and UF-2. This will be measured by completion of schedule milestones.

Human Exploration and Development of Space FY01 Performance Plan

Strategic Plan Goal	Strategic Plan Objective	O1#	FY 01 Target	FY 01 Indicators
Enable and establish a permanent and productive human presence in Earth orbit	Deploy and use the ISS to advance scientific, exploration, engineering, and commercial objectives Ensure and enhance the health, safety, & performance of humans in space	1H14	Successfully complete no less than 85% of the planned Russian Program Assurance schedules and milestones required for the development of the Propulsion Module.	Initiate Propulsion Module Fabrication/Assembly/Integration and Testing in preparation for launch in late FY 2002. This will be measured by completion of schedule milestones.
Enable and establish a permanent and productive human presence in Earth orbit	Deploy and use the ISS to advance scientific, exploration, engineering, and commercial objectives Ensure and enhance the health, safety, & performance of humans in space	1H15	Successfully complete no less than 75% of the planned crew return capability schedules. FY01 indicators will include accomplishment of program schedule milestones for Phase 1 development of a crew return vehicle that could provide U.S. crew return capability.	Complete Crew Return Vehicle (CRV) Phase 1 tasks including Preliminary Design Review (PDR). This will be measured by completion of schedule milestones.
Enable and establish a permanent and productive human presence in Earth orbit	Objective: Ensure the health, safety and performance of humans living and working in space	1H17	Develop new biomedical and technological capabilities to facilitate living and working in space and the safe return to Earth.	Flight test countermeasure to reduce kidney stone risk . Develop two new evidence-based health protective countermeasure candidates ready for evaluation in an operational setting.
Enable and establish a permanent and productive human presence in Earth orbit	Objective: Ensure the health, safety and performance of humans living and working in space	1H18	Develop and demonstrate technologies for improved life support systems.	Demonstrate, in ground test, technologies that could reduce up to 25% of life support logistics over ISS baseline and release report of progress for review on the internet. Perform detailed calculation of life support equivalent system mass index and place online for review and comment. Equivalent system mass index is a measure of the performance of a life support system incorporating demonstrated technologies.
Enable and establish a permanent and productive human presence in Earth orbit	Objective: Ensure the health, safety and performance of humans living and working in space	1H31	Initiate implementation of the Bioastronautics Initiative.	Initiate NASA/NCI collaboration to develop minimally invasive technologies and approaches for detecting and interpreting biological signatures that signal the emergence of disease. Initiate expansion of the teams and tasks of the NSBRI for the development of countermeasures, by adding approximately 15 investigations (tasks).

Human Exploration and Development of Space FY01 Performance Plan

Strategic Plan Goal	Strategic Plan Objective	01#	FY 01 Target	FY 01 Indicators
Enable and establish a permanent and productive human presence in Earth orbit.	Meet sustained space operations needs while reducing costs.	1H20	Increase the percentage of the space operations budget allocated to acquisition of communications and data services from the commercial sector to 15%.	Increase to 15% the space operations budget allocated to acquisition of commercial communications and data services from the 10% FY 2000 performance target.
Enable and establish a permanent and productive human presence in Earth orbit.	Meet sustained space operations needs while reducing costs.	1H21	Achieve at least 95 percent of planned data delivery, on average, from space flight missions as documented in space, ground, deep space, and NASA integrated service networks performance metrics consistent with detailed program and project operations requirements in project service level agreements.	Achieve at least 95 percent data delivery for all space flight missions as documented in network performance metrics.
Goal: Expand the Commercial Development of Space.	Facilitate access to space for commercial researchers	1H22	Establish at least ten new, active industrial partnerships to research tomorrow's space products and improve industrial processes through NASA's Commercial Centers and find opportunities for space experiments.	Ensure that Commercial Centers execute ten new partnership agreements. Monitor the ratio of flight experiments to ground experiments.
Goal: Expand the Commercial Development of Space.	Foster commercial participation on the International Space Station.	1H23	Foster commercial endeavors by reviewing and/or implementing new policies and plans, such as the Space Station resource pricing policy and intellectual property rights policy. Ensure that Space Station resources allocated to commercial research are utilized by commercial partners to develop commercial products and improve industrial processes.	Review and/or implementing Space Station resource pricing and intellectual property rights policies. Ensure Space Station resources allocated to commercial research are utilized by commercial partners to research tomorrow's products and improve industrial processes.
Goal: Share the Experience and Discovery of human space flight	Increase the scientific, technological and academic achievement of the nation by sharing our knowledge, capabilities, and assets	1H26	Support participation in HEDS research.	Enable at least 50 students to participate in commercial space flight and technologies research. Through the use of national teacher conferences and workshops, provide approximately 200 elementary and high school classrooms nationwide with electronic (multimedia/computer technologies) and printed materials that focus on activities in science, math and technology relating to life sciences and microgravity research and specifically written for students in grades K-12. Complete a broadly based student competition on innovative design concepts that address HEDS technological challenges. Complete customer engagement plan.
Cross-cutting target		1H29	Improve health of the NASA workforce	Develop and implement supervisor-specific training for the identification and management of stress in the work unit. Develop and implement training on techniques for coping with stress for the individual employee. Begin a robust audit program of NASA Centers' occupational health programs, completing at least six (6) to ensure quality and continuous improvement of medical care and services including medical and environmental monitoring efforts, preventive services, emergency response capability, and clinical intervention capability.

HEDS FY01	Budget Category	Space Station	Space Shuttle	Payload and ELV Support	Space Operations	Life and Microgravity Sciences	HEDS Investments	Research and Program Management
Performance Target								
1H1: Complete testing and delivery for spacecraft integration of experiments for the Mars Surveyor Program 2001 orbiter and lander missions.						X	X	
1H2: Complete initial next decade planning mission architecture studies.							X	
1H32: Initiate the HEDS Technology/Commercialization program and establish a synergistic relationship with industry.							X	
1H3: Support an expanded, productive research community to include 975 investigations by 2001.						X		
1H4: Conduct outstanding peer-reviewed and commercial research on STS 107 to advance knowledge in the fields of medicine, fundamental biology, biotechnology, fluid physics, materials processing and combustion.						X		
1H5: Begin research on the International Space Station						X		
1H6: The Office of Space Flight will expedite a safety improvement program to ensure the continued safe operations of the Space Shuttle that ensures the availability of a safe and reliable Shuttle system to support Space Station Assembly milestones and operations.			X					
1H7: Achieve 8 or fewer flight anomalies per mission.			X					
1H30: Achieve 100% on-orbit mission success			X					
1H10: Successfully complete the majority of the planned development schedules and milestones required to support the Multi-element Integration Testing		X						
1H11: Successfully complete the majority of the ISS planned on-orbit activities such as delivery of mass to orbit and enhanced functionality.		X						

HEDS FY01	Budget Category	Space Station	Space Shuttle	Payload and ELV Support	Space Operations	Life and Microgravity Sciences	HEDS Investments	Research and Program Management
Performance Target								
1H12: Successfully complete the majority of combined ISS planned operations schedules and milestones as represented by indicators of permanent human on-orbit operations.		X						
1H13: Successfully complete the majority of the planned research activities in support of initiation of on-orbit research opportunities.		X				X		
1H14: Successfully complete no less than 85% of the planned Russian Program Assurance schedules and milestones required for the development of the Propulsion Module.		X						
1H15: Successfully complete no less than 75% of the planned crew return capability schedules. FY01 indicators will include accomplishment of program schedule milestones for Phase 1 development of a crew return vehicle that could provide U.S. crew return capability.		X						
1H17: Develop new biomedical and technological capabilities to facilitate living and working in space and safe return to Earth.						X		
1H18: Develop and demonstrate technologies for improved life support systems.						X		
1H31: Initiate implementation of the Bioastronautics Initiative						X		
1H20: Increase the percentage of the space operations budget allocated to acquisition of communications and data services from the commercial sector to 15%.					X			

HEDS FY01	Budget Category	Space Station	Space Shuttle	Payload and ELV Support	Space Operations	Life and Microgravity Sciences	HEDS Investments	Research and Program Management
Performance Target								
1H21: Achieve at least 95 per cent of planned data delivery, on average, from space flight missions as documented in space, ground, deep space, and NASA integrated service networks performance metrics consistent with detailed program and project operations requirements in project service level agreements.					X			
1H22: Establish at least ten new, active industrial partnerships to research tomorrow's space products and improve industrial processes through NASA's Commercial Centers, and find opportunities for space experiments						X		
1H23 Foster commercial endeavors by reviewing and/or implementing new policies and plans, such as the Space Station resource pricing policy and intellectual property rights policy. Ensure that Space Station resources allocated to commercial research are utilized by commercial partners to develop commercial products and improve industrial processes.		X				X		
1H26: Support participation in HEDS research.						X		
1H29: Improve health of the NASA workforce						X		